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PATENT ABSTRACTS OF JAPAN

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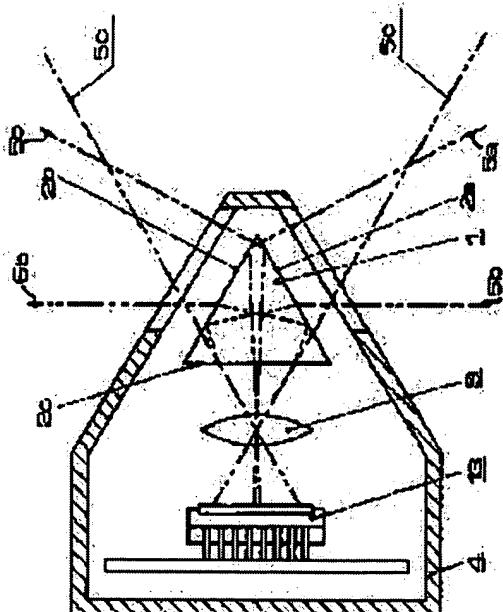
(72) Inventor : YABE SANAE
SAKATA KAZUKI
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(54) CAMERA DEVICE

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a camera device by which photographing in plural directions is made possible by one prism and which is inexpensive and small-sized and to unify the directions of respective areas even in the case where area images whose directions are different coexist.

SOLUTION: The prism 1 provided with surfaces 2a and 2b on which incident light beams 5a and 5b from left and right directions are made incident is arranged on the front surface of an image pickup lens 3 at this camera device, and the images of the incident light beams 5a and 5b which pass through the prism 1 and a light beam 5c that does not pass through the prism 1 are formed on an imaging device 13 through the image pickup lens 3. Also an image inversion processing part inverting the left and right of the video of a part of areas out of the videos of plural areas is provided.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to what is used in order to start the camera equipment which can photo the image of the direction of plurality and can supervise a wide range visual field, for example, to be carried in a car and to secure the insurance of car operation.

[0002]

[Description of the Prior Art] Conventionally, various the camera which photos the direction of plurality, cameras which photo the direction of plurality and perform a right-and-left reversal process to an output image, and systems are proposed, and it is a known technique about the technique of carrying out right-and-left reversal of the image.

[0003] For example, there are some which were indicated by JP,8-111799,A as a camera which photos three directions using a mirror. Although this camera photos the field image of three directions with one camera with two or more mirrors and the combination of a lens, in order to reflect incident light twice by the mirror and to carry out image formation to a lens, there was a trouble that the dimension of camera equipment became large.

[0004] Moreover, the direction of plurality is photoed and the camera which performs a right-and-left reversal process to an output image at an output image, and the bottom have some which were indicated by JP,8-248484,A. Although this camera photos right-and-left each direction of a car with one camera using a mirror, the obtained image is put in block by the digital disposal circuit and right-and-left reversal is carried out, when an image was put in block in this way and it was reversed, it was a premise that the sense of the field image to include is the same, and it was impossible to have made the field image with which the sense is different intermingled.

[0005] Moreover, the direction of plurality is photoed and there are some which were indicated by JP,5-310078,A as a system which performs a right-and-left reversal process to an output image at an output image. This system photos two or more fields using two or more cameras, and after it carries out right-and-left reversal of the image information obtained from each camera if needed, it is compounded by one image information. In this case, since two or more cameras are used, there is a problem on a tooth space or cost.

[0006]

[Problem(s) to be Solved by the Invention] As mentioned above, when realizing the camera which photos the direction of plurality, by the technique using two or more mirrors, there is a problem that the dimension of the whole equipment becomes large. Moreover, in the camera which performs a right-and-left reversal process to the output image which photoed the direction of plurality, since the right-and-left reversal process of the obtained image is carried out collectively, it is impossible to make the field image with which the sense is different intermingled. Furthermore, two or more fields are photoed with two or more cameras, in the system which performs the right-and-left reversal process of only the field of arbitration, large-scale-izing of a system is inevitable and a problem is in a tooth space or cost.

[0007] This invention was made in order to cancel the above troubles, and it enables photography more than a 2-way using one prism, and it aims at offering cheap and small camera equipment. Moreover, even when the field image with which the sense is different by performing a right-and-left reversal process to some photography images is made intermingled, it aims at obtaining the camera equipment which the direction of each field is unified and can be used for a wide range application.

[0008]

[Means for Solving the Problem] Invention of claim 1 is camera equipment which can photo the image of the direction of plurality with the combination of prism and an image pick-up lens, and the optical path of photography incident light prepares the field which passes prism, and the field which does not pass prism, and is characterized by making an image pick-up side carry out image formation of the light which passed the above-mentioned prism, and the light not passing through an image pick-up lens.

[0009] Invention of claim 2 is characterized by for the prism of invention of claim 1 carrying out incidence of the photography light of a 2-way at least, and making an image pick-up side it carry out image formation through the above-mentioned image pick-up lens.

[0010] Invention of claim 3 is characterized by having equipped the prism of invention of claim 2 with the 2nd [at least] page of the field as for which light carries out incidence and which makes the include angle of 60 degrees mutually, and having arranged the above-mentioned prism in the front face of an image pick-up lens.

[0011] Invention of claim 4 is camera equipment which can photo the image of two or more fields, and is characterized by having the image reversal process section which carries out right-and-left reversal of the image of a partial field among the images of two or more fields.

[0012] Invention of claim 5 is characterized by constituting the image reversal process section of invention of claim 4 by field setting means to set up a reversal field, and the means which switches the driving pulse at the time of changing into a video signal according to a field setup with the image sensor which is an image pick-up side.

[0013] Invention of claim 6 is characterized by constituting the image reversal process section of invention of claim 4 by the means which switches the driving pulse at the time of changing into a video signal, a color separation pulse, and a signal-processing pulse according to a field setup with a field setting means to set up a reversal field, and the image sensor which is an image pick-up side.

[0014] Invention of claim 7 is characterized by constituting the image reversal process section of invention of claim 4 by field setting means to set up a reversal field, means to record the output signal from the image sensor which is an image pick-up side on memory, and means to change the sequence which reads a signal according to a field setup in case a signal is read from memory using a timing generator.

[0015] A field setting means by which, as for invention of claim 8, the image reversal process section of invention of claim 4 sets up a reversal field, A means to record the signal divided into three mutually-independent sorts which were outputted from the image sensor which is an image pick-up side, and include a chrominance signal and a luminance signal on each memory, In case a signal is read from memory using a timing generator, it is characterized by being constituted by means to change the sequence which reads a signal according to a field setup.

[0016]

[Embodiment of the Invention] Gestalt 1. drawing 1 of operation is the block diagram which looked at the camera equipment by the gestalt 1 of implementation of this invention from the top. The camera equipment by the gestalt 1 of this operation is equipped with the taking lens 3 which carries out incidence of the light of the above-mentioned longitudinal direction through the prism 1 which carries out incidence of the image pick-up light from a longitudinal direction, and prism 1, and the light which does not mind prism 1, and the image sensor 13 which picturizes the light from a taking lens 3, and is contained by the camera tank 4. And after incident light 5a from the right penetrates front 2a of prism 1, internal reflection of it is carried out with front 2b, and it penetrates tooth-back 2c, it carries out incidence to the image pick-up lens 3, and it connects a handstand mirror image to the right half of an image sensor 13. Moreover, after incident light 5b from the left penetrates front 2b of prism 1, internal reflection of it is carried out in front 2a, and it penetrates tooth-back 2c, it carries out incidence to a taking lens 3, and it connects a handstand mirror image to the left half of an image sensor 13.

[0017] Moreover, drawing 2 is drawing which looked at the camera equipment which is the gestalt 1 of implementation of this invention from width, incidence of the incident light 5c from down is carried out to the image pick-up lens 3, the incident light of an epilogue and the above-mentioned longitudinal direction which penetrated tooth-back 2c of prism 1 carries out incidence of the handstand normal image to the image pick-up lens 3 in the upper half of an image sensor 13, and an image is connected to the lower half of an image sensor 13.

[0018] The image photoed with the camera constituted as mentioned above is shown in drawing 3. The mirror image image according [left screen 6a] to incident light 5a from the right, the mirror image image according [right screen 6b] to incident light 5b from the left, and bottom screen 6c are the normal image images by incident light 5c from down.

[0019] As mentioned above, if the prism 1 with which the one direction was cut is arranged in a part of front face of an image pick-up lens, it will become possible to photo the field of three directions with one camera.

[0020] Since the image connected with the gestalt 1 of the gestalt 2. above-mentioned implementation of operation to the image sensor 13 is outputted as a video signal as it is, as shown in drawing 3, by bottom screen 6c, the sense of an image differs from 6d of upper screens which consist of left screen 6a and right screen 6b. So, with the gestalt 2 of operation, if right-and-left reversal of the image of 6d of upper screens which are a mirror image by having the function which carries out right-and-left reversal of the image partially is carried out, the normal image of the field of three directions can be photoed with one camera. Moreover, if right-and-left reversal of the image of bottom screen 6c is carried out, the mirror image of the field of three directions can be photoed with one camera.

[0021] Drawing 4 is the circuit block diagram showing the camera equipment of the gestalt 2 of operation. The field setting circuit 7 is a circuit which outputs the reversal instruction signal which shows whether only the direction of V sets up with a switch etc. the field which performs a right-and-left reversal process among the images of two or more fields condensed with the image pick-up lens 1, and a right-and-left reversal process is performed for every field. The reversal instruction signal with which the timing conversion circuit 8 is obtained from the field setting circuit 7, It is the circuit which generates the driving pulse of CCD which is an image sensor 13 based on the signal acquired from a timing generator (TG) 9. It is the circuit which generates the usual driving pulse when it is shown that the above-mentioned reversal instruction signal is the field which does not perform a right-and-left reversal process, and generates the driving pulse which makes reverse read-out sequence of the signal charge at the time of a level transfer when it is shown that it is the field which performs a right-and-left reversal process.

[0022] In an image sensor 13, according to the driving pulse obtained from the timing conversion circuit 8, photo electric conversion is performed about the light figure by which image formation is carried out from a lens 1, and a video signal is outputted. In a digital disposal circuit 10, it processes inserting a synchronizing signal etc. to the video signal acquired from an image sensor 13, and is outputted to it as a picture signal.

[0023] Thus, only for example, the direction of V sets up the field which performs a right-and-left reversal process according to the gestalt 2 of operation, and the image information in the set-up field is reversing and outputting a horizontal read-out location, and becomes possible [carrying out right-and-left reversal of the image in the above-mentioned field].

[0024] In addition, what kind of setting approach may be used for not limiting it to this by this invention, but setting it up based on the input signal and the predetermined field from the outside, although the setting approach of the field setting circuit 7 is explained by the approach which used the switch etc.

[0025] Although the image sensor driving pulse of a field which wants to carry out right-and-left reversal of the image is switched and a right-and-left reversal process is realized with the gestalt 2 of gestalt 3. implementation of operation, when it uses for color camera equipment, the sequence becomes [the color information on the image which originated and carried out the right-and-left reversal process to the color filter on an image sensor not being bilateral symmetry] reverse to the latter signal-processing section. For this reason, since the fault of not being normally processed about the color of the pars inflexa is imitated, it comes and abnormalities are caused to reappearance of color information, it cannot be used as a camera for a check by looking.

[0026] Drawing 5 is the circuit block diagram showing the camera equipment of the gestalt 3 of operation, and in drawing, since the image pick-up lens 1, the field setting circuit 7, the timing conversion circuit 8, the timing generator 9, and CCD image sensor 13 are the same as the gestalt 2 of operation, it omits the explanation.

[0027] The brightness separation circuit 11 is a circuit which extracts the luminance signal in the video signal outputted from an image sensor 13, and, in the case of the image sensor of a color difference line sequential color TV system, it usually consists of LPF. The color separation circuit 12 is a circuit which extracts two chrominance signals, and is separated into the signal of R system and B system from the video signal outputted from an image sensor 13 by two sorts of color separation pulses. The color separation pulse change-over circuit 14 is a circuit which switches two kinds of color separation pulses acquired from a timing generator 9 according to the reversal instruction signal acquired from the field setting circuit 7.

[0028] When it is shown that the reversal instruction signal from the above-mentioned field setting circuit 7 is the field which does not perform a right-and-left reversal process, in the color separation pulse change-over circuit 14, a change-over of R system color separation pulse acquired from a timing generator 9 and B system color separation pulse is not performed, but it inputs into the color separation circuit 12 in the condition as it is. In the color separation circuit 12, using R system color separation pulse, R system chrominance signal is generated and B system chrominance signal is generated using B system color separation pulse.

[0029] Moreover, when it is shown that the above-mentioned reversal instruction signal is the field which performs a right-and-left reversal process, in the color separation pulse change-over circuit 14, R system color separation pulse and B system color separation pulse which are acquired from a timing generator 9 are switched, and the appearance corresponding to the sequence of the color filter on an image sensor and two kinds of signals are inputted into the color separation circuit 12 in the condition of having changed mutually. That is, in the color separation circuit 12, using B system color separation pulse, R system chrominance signal is generated and B system chrominance signal is generated using R system color separation pulse.

[0030] In a digital disposal circuit 10, after performing predetermined processing to two kinds of chrominance signals generated in the color separation circuit 12, and the luminance signal generated in the brightness separation circuit 11, R-Y, two kinds of color-difference signals of B-Y, and a luminance signal Y are generated.

[0031] In an encoder 15, it is encoded from the three above-mentioned sorts of signals by the video signal based on

signal specification, such as NTSC.

[0032] Thus, according to the gestalt 3 of operation, only for example, the direction of V sets up the field which performs a right-and-left reversal process, and it becomes possible to carry out a right-and-left reversal process, the image information in the set-up field reversing and outputting a horizontal read-out location, and maintaining the image in the above-mentioned field at a normal color further the appearance corresponding to the color filter on an image sensor for two kinds of color separation pulses, and by switching and performing color separation processing.

[0033] Gestalt 4. drawing 6 of operation is the circuit block diagram showing the camera equipment of the gestalt 4 of operation. Image formation of the light figure of two or more fields condensed with the image pick-up lens 1 is carried out to an image sensor 13, and the video signal by which photo electric conversion was carried out is recorded on memory 16.

[0034] The field setting circuit 7 is a circuit which outputs the reversal instruction signal which shows whether the field which performs a right-and-left reversal process among the images of two or more fields condensed with the image pick-up lens 1 is set up with a switch etc., and a right-and-left reversal process is performed for every field. The read-out signal generation circuit 18 is a circuit which generates the signal at the time of reading a signal from memory 16 based on the reversal instruction signal acquired from the field setting circuit 7, and the signal acquired from a timing generator 9. The signal which reads a horizontal location for the video signal in memory 16 to hard flow in a reversal field when it is shown that the reversal instruction signal of the above-mentioned field setting circuit 7 is the field which performs a right-and-left reversal process generates, and when it is shown that it is the field where the above-mentioned reversal instruction signal does not perform a right-and-left reversal process, the signal which reads the video signal in memory 16 to the forward direction generates. According to the signal acquired from the read-out signal generation circuit 18, by the digital disposal circuit 10, the video signal read from memory 16 processes inserting a synchronizing signal etc., and is outputted as a picture signal.

[0035] While making memory memorize the video signal of an image sensor, in case the field which performs a right-and-left reversal process is set up and a signal is read from memory according to the gestalt 4 of operation as mentioned above, the picture signal in the set-up field is reversing and reading a horizontal read-out location, and it becomes possible to carry out right-and-left reversal of the image in the arbitrary area in two or more fields.

[0036] Although the video signal outputted from an image sensor is recorded on memory, the sequence which reads a signal is switched and a right-and-left reversal process is realized with the gestalt 4 of gestalt 5. implementation of operation, when it uses for a color camera, the sequence becomes [the color information on the image which originated and carried out the right-and-left reversal process to the color filter on an image sensor not being bilateral symmetry] reverse to the latter signal-processing section. For this reason, since the fault of not being normally processed about the color of the pars inflexa is imitated, it comes and abnormalities are caused to reappearance of color information, it cannot be used as a camera for a check by looking.

[0037] Drawing 7 is the circuit block diagram showing the camera equipment of the gestalt 5 of operation, and in drawing, since the image pick-up lens 1, an image sensor 13, the field setting circuit 7, the read-out signal generation circuit 18, the timing generator 9, and the digital disposal circuit 10 are the same as the gestalt 4 of operation, it omits the explanation.

[0038] The brightness separation circuit 11 is a circuit which separates the light and darkness of a light figure, it is the circuit which separates brightness from the video signal acquired from an image sensor 13, and generates a luminance signal, and the generated luminance signal is recorded on memory 17a.

[0039] The color separation circuit 12 is a circuit which separates the tint of a light figure, the tint of a light figure is separated from the video signal acquired from an image sensor 13 using two kinds of color separation pulses acquired from the color separation pulse change-over circuit 14, it is the circuit which generates two kinds of chrominance signals, and two kinds of generated chrominance signals are recorded on Memory 17b and 17c.

[0040] After they perform processing predetermined by the digital disposal circuit 10, respectively, the luminance signal and two kinds of chrominance signals which were read from Memory 17a, 17b, and 17c according to the signal acquired from the read-out signal generation circuit 18 are outputted as a luminance signal Y and two kinds of color-difference signals, R-Y and B-Y, are encoders 15 and are encoded by the video signal based on signal specification, such as NTSC.

[0041] It becomes possible to carry out a right-and-left reversal process, maintaining the image in the above-mentioned field at a normal color by reversing and reading the horizontal location of the various signals in the set-up field, in case memory is made to memorize each signal and a signal is read from memory according to the gestalt 5 of operation as mentioned above, after setting up the field which performs a right-and-left reversal process and separating into a video signal, a luminance signal, and two kinds of chrominance signals.

[0042] Although it has memorized in memory with the camera equipment of drawing 7 after separating into a video

signal, a luminance signal, and two kinds of chrominance signals, as shown in drawing 8, the luminance signal Y outputted from a digital disposal circuit 10, and R-Y and two kinds of color-difference signals of B-Y may be recorded on Memory 17a, 17b, and 17c, and you may reproduce based on the signal from the read-out signal generation circuit 18.

[0043]

[Effect of the Invention] As mentioned above, according to invention of claim 1, when the optical path of photography incident light prepares the field which passes prism, and the field which does not pass prism and makes an image pick-up side carry out image formation of the light which passed the above-mentioned prism, and the light not passing through an image pick-up lens, the combination of the image of the direction of plurality can be incorporated flexibly.

[0044] According to invention of claim 2 and claim 3, the incident light of at least 3 directions, for example, a longitudinal direction, can be incorporated through prism, a top or down incident light can be incorporated without letting prism pass, and the camera equipment which can photo the cheap and small direction field of plurality can be offered.

[0045] According to invention of claim 4 to claim 8, it made it possible to carry out right-and-left reversal only of the image of a field in part by having the image reversal process section which carries out right-and-left reversal of the image of a partial field among the images of two or more fields, for example, the means which switches the driving pulse of CCD for every field of the direction of V. Therefore, even if it takes a photograph and the normal image and the mirror image are intermingled in the image, the camera equipment [unifying into either is possible and] which can be used for a wide range application can be offered.

[0046] While making it possible to carry out right-and-left reversal of the image of a field in part especially according to invention of claim 6, it made it possible to carry out right-and-left reversal of the color information correctly by having the means which switches the classification-by-color pulse used at the time of color separation processing for every field. Therefore, even if it takes a photograph and the normal image and the mirror image are intermingled in the image, the color camera equipment [unifying into either is possible and] which can be used for a wide range application can be offered.

[0047] Even when the image sensor which can be read only to the forward direction by according to invention of claim 7 having the memory which records the video signal acquired from an image sensor on the camera which photos two or more fields, and having the means which switches the sequence which reads a video signal from memory for every field is used, right-and-left reversal of the image of an arbitrary area can be carried out.

[0048] Right-and-left reversal of the color picture of an arbitrary area can be carried out by separating into three sorts of signals required for the camera which photos two or more fields according to invention of claim 8 in order to express light which go direct mutually, having the memory which records each signal, and having the means which switches the sequence which reads signaling information from memory for every field.

[Translation done.]

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CLAIMS**[Claim(s)]**

[Claim 1] Camera equipment with which it is camera equipment which can photo the image of the direction of plurality with the combination of prism and an image pick-up lens, and the optical path of photography incident light is characterized by to make an image pick-up side carry out image formation of the light which prepared the field which passes prism, and the field which does not pass prism, and passed the above-mentioned prism, and the light not passing through an image pick-up lens.

[Claim 2] The above-mentioned prism is camera equipment according to claim 1 characterized by carrying out incidence of the photography light of a 2-way at least, and making an image pick-up side carry out image formation through the above-mentioned image pick-up lens.

[Claim 3] The above-mentioned prism is camera equipment according to claim 2 characterized by having equipped light with the 2nd [at least] page of the field which carries out incidence, and which makes the include angle of 60 degrees mutually, and having arranged the above-mentioned prism in the front face of an image pick-up lens.

[Claim 4] Camera equipment characterized by having the image reversal process section which is camera equipment which can photo the image of two or more fields, and carries out right-and-left reversal of the image of a partial field among the images of the above-mentioned two or more fields.

[Claim 5] The above-mentioned image reversal process section is camera equipment according to claim 4 characterized by being a field setting means to set up a reversal field, and the means which switches the driving pulse at the time of changing into a video signal according to a field setup with the image sensor which is an image pick-up side.

[Claim 6] The above-mentioned image reversal process section is camera equipment according to claim 4 characterized by being the means which switches the driving pulse at the time of changing into a video signal, a color separation pulse, and a signal-processing pulse according to a field setup with a field setting means to set up a reversal field, and the image sensor which is an image pick-up side.

[Claim 7] The above-mentioned image reversal process section is camera equipment according to claim 4 characterized by being a field setting means to set up a reversal field, a means to record the output signal from the image sensor which is an image pick-up side on memory, and a means to change the sequence which reads a signal according to a field setup in case a signal is read from memory using a timing generator.

[Claim 8] The above-mentioned image reversal process section is camera equipment according to claim 4 characterized by to be a means record the signal divided into three mutually-independent sorts which were outputted from a field setting means set up a reversal field, and the image sensor which is an image pick-up side, and include a chrominance signal and a luminance signal on each memory, and a means change the sequence which reads a signal according to a field setup in case a signal reads from memory using a timing generator.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram which looked at the camera equipment by the gestalt 1 of implementation of this invention from the top.

[Drawing 2] It is the block diagram which looked at the camera equipment by the gestalt 1 of implementation of this invention from width.

[Drawing 3] It is drawing showing an example of the output screen of the camera equipment by the gestalt 1 of implementation of this invention.

[Drawing 4] It is the circuit block diagram of the camera equipment by the gestalt 2 of implementation of this invention.

[Drawing 5] It is the circuit block diagram of the camera equipment by the gestalt 3 of implementation of this invention.

[Drawing 6] It is the circuit block diagram of the camera equipment by the gestalt 4 of implementation of this invention.

[Drawing 7] It is the circuit block diagram of the camera equipment by the gestalt 5 of implementation of this invention.

[Drawing 8] It is the circuit block diagram of the camera equipment by the gestalt 5 of implementation of this invention.

[Description of Notations]

1 Prism, 2a, 2b, 2C Field of Prism, 3 Image Pick-up Lens, 4 A camera tank, 5a The incident light from the right, 5b Incident light from the left, 5c The incident light from the bottom, 6a A left screen, 6b A right screen, 6c Bottom screen, 6d A top screen, 7 A field setting circuit, 8 Timing conversion circuit, 9 A timing generator, 10 A digital disposal circuit, 11 A brightness separation circuit, 12 A color separation circuit, 13 An image sensor, 14 color-separation pulse change-over circuit, 15 Encoder, 16, 17a, 17b, 17c Memory, 18 Read-out signal generation circuit.

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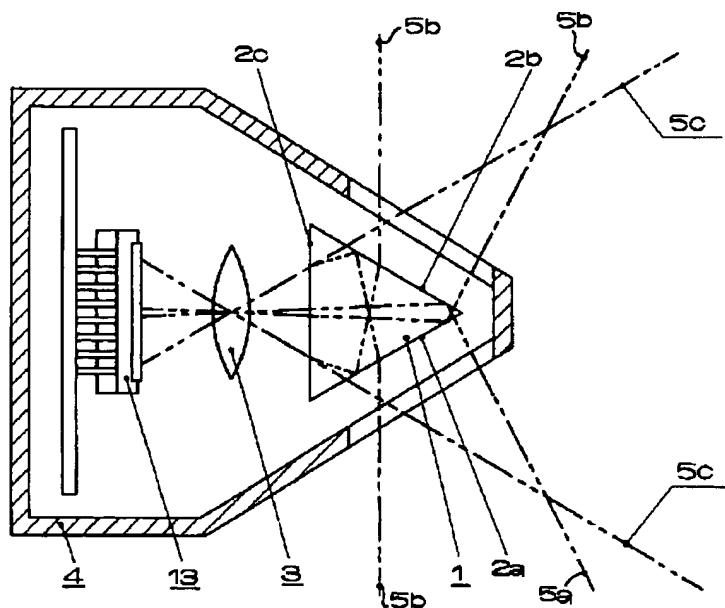
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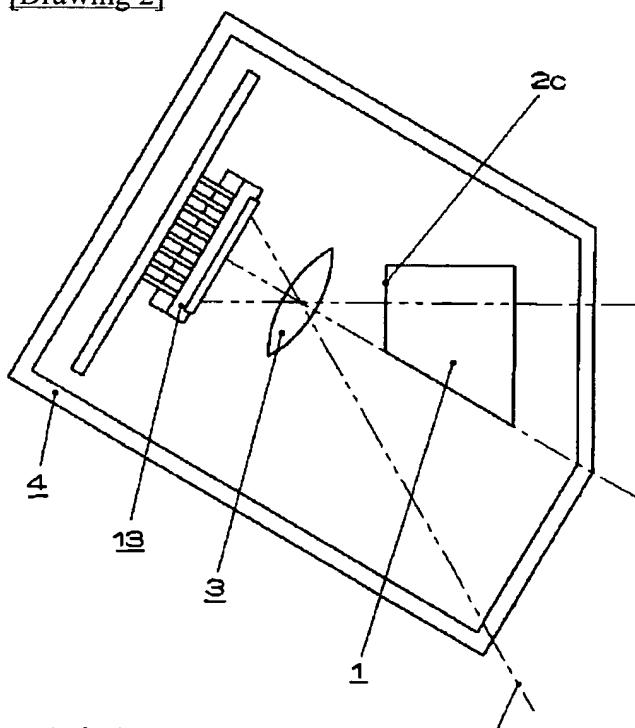
DRAWINGS

[Drawing 1]

1: プリズム
2a, 2b, 2c: プリズムの面
3: 撮像レンズ
4: カメラ外箱
5a: 右方向からの入射光
5b: 左方向からの入射光
5c: 下からの入射光
13: 撮像素子



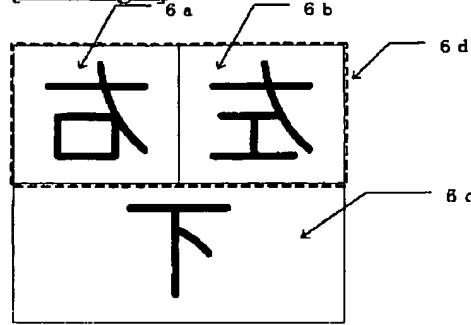
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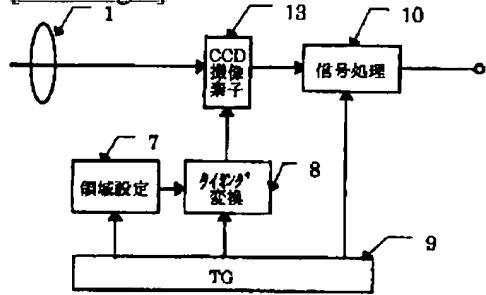
1: プリズム
2a, 2b, 2c: プリズムの面
3: 撮像レンズ
4: カメラ外箱

5c: 下からの入射光
13: 撮像素子

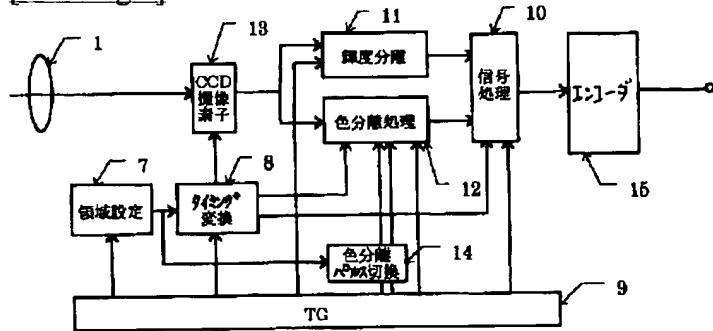
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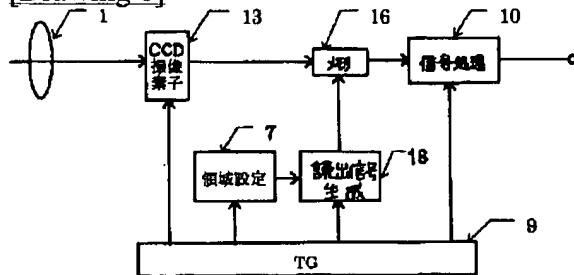
[Drawing 4]



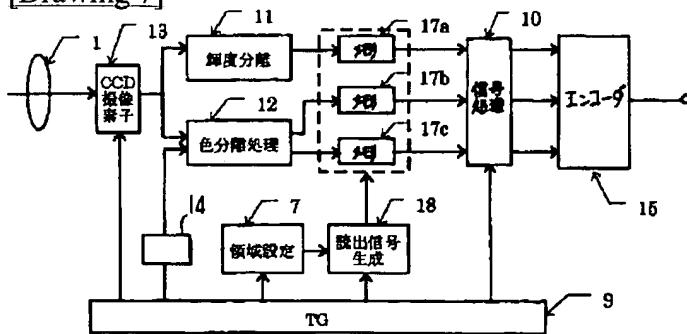
[Drawing 5]



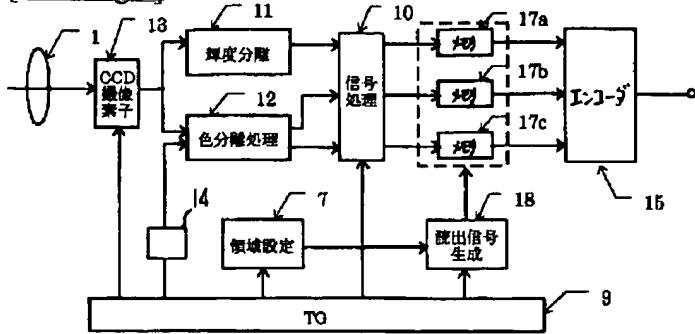
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]